USEEJ3 - Introduction of signal processing

Mis à jour le 02-04-2020

Code : USEEJ3

Unité spécifique de type mixte

4 crédits

Responsabilité nationale :
EPN03 - Electroniques, électrotechnique, automatique et mesure (EEAM) / Hmaïed SHAIEK

Contact national :

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Présentation

Prérequis

Have a level bac + 2 in electronics (BTS, DUT, L2) and basis on mathematics for deterministic and random signals.

Objectifs pédagogiques

The main objective of this course is to give to students a clear view on the characterisation (time and frequency domain, spectrum and probability density function) of deterministic and random signals.

- Time and frequency representation (Fourier transform and power spectral density),
- Study of filtering operations (convolution operation)

Sampling and analog to digital conversion

Compétences

Upon completion of the subject, students will be able to:

Professional/academic knowledge and skills

a. skills in Fourier analysis and transform, able to go from the time to frequency domain and vice versa,
b. able to characterize deterministic and random signals in the frequency domain (Fourier transform, random processes, autocorrélation function, power spectral density),
c. able to characterize amplitude of random signals (random variables, probability density function, cumulative distribution function),
d. able to study a signal processing chain with addition and multiplication of random signals, able to compute the signal to noise ratio at the output of a signal processing chain,
e. able to characterize narrow band signals (complex envelope, low pass equivalent chain), able to study a transmission system with amplitude modulation,
f. able to use Matlab software for simulations of signal processing studies.

Programme

Contenu

1. Introduction
2. Filtering
3. Fourier series and transform
4. Finite energy deterministic signals
5. Finite power deterministic signals
6. Random processes
7. Random signal and power spectral density
8. Operations (Filtering, addition, multiplication) of random signals
9. Narrow band signals
10. Application to amplitude modulations

Modalités de validation

- Examen final

Description des modalités de validation

The course is validated if the mark is higher or equal to 10/20

Bibliographie

Titre	Auteur(s)

Méthodes et techniques de traitement du signal - 2e cycle / Master - Ecoles d'ingénieurs, Cours et exercices corrigés	Jacques Max, Jean-Louis Lacoume, Éditeur : Dunod
Aide-mémoire - Traitement du signal - 3e édition, Aide-mémoire	Dunod
Practical Signal Processing, 2012, Cambridge University press, isbn: 9781107411821	Mark Owen
Signals and Systems, Prentice Hall, 1997	A.V Oppenheim, A.S. Willsky, S. Hamid,
Digital Communications, Mc Graw-Hill, 4th edition,2001	J. Proakis